



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

ON THE VARIABILITY OF *SPHÆRIA QUERCUM*, Schw.

BY J. B. ELLIS.

Among the Sphæriaceous fungi of Southern New Jersey, no species perhaps is oftener met with than *Sphæria Quercum*, Schw. And perhaps, it might be added, no species is more difficult to define and classify. Fries includes it among the "Confluentes," remarking (Elench. ii. p. 84) that many species of that section approach very near to the *Dothideas*. Berkeley, in "Grevillea," places it in *Melogramma*, taking that genus doubtless as defined in his Outlines of British Fungology, p. 391, and by Fries in Sum. Veg. Scan. p. 386. Tulasne, however, who had examined this species, did not include it his genus *Melogramma* (see his Selecta Fungorum Carpologia, vol. ii. p. 81).

On examining the two genera, *Melogramma* and *Dothidea*, it will be seen that there are no salient and unmistakable characters by which they may be distinguished. Tulasne, l. c., says of his genus *Melogramma*, "Perithecia globosa ex parietibus nunc e parenchymate materno vix distinctis nec solubilibus, nunc contra sine negotio sejungendis facta;" a definition which will include two different types of perithecia, viz., those with walls not separable from the substance of the stroma, and others with walls readily separable; in the former case scarcely distinguishable from *Dothidea*, in which genus the ascigerous nucleus is contained in cavities in the stroma without any distinct perithecium. Perhaps the most obvious character separating the two genera may be found in the stroma which is more highly developed in *Dothidea*; but even here species occur, *Dothidea perisporioides*, B. & C. for example, where the stroma is so imperfectly developed as to leave the classification somewhat doubtful. Not less difficult is it to refer to their proper place the various forms of *Sphæria Quercum*, Schw., occurring as it does now scattered and distinct, and again, on the same branch, confluent and united in a stroma more or less evident; now with hardly a trace of an ostiolum, and again with a distinct cylindric beak equalling in length one-fourth or one-third the height of the perithecium itself. The various forms, however, all agree in having normally a subcuticular origin, on the surface of the inner bark, just beneath the epidermis, which

is soon ruptured with many small openings where the perithecia are scattered, or with much larger gaps where several perithecia more or less distinctly confluent, are grouped together. On peeling off the epidermis, the perithecia are generally left adhering to the inner bark, though in some cases where the cuticle is thick and tough, as in the cherry, they adhere to the inner surface of the cuticle itself.

The mycelium which spreads over and penetrates the matrix consists of variously branched and anastomosing dark brown septate threads which are more luxuriant in proportion as the substance of the matrix is of a soft and spongy nature. This mycelium assumes at length a darker shade, so that the substance of the bark and the subjacent surface of the wood becomes finally almost black. The perithecia are always filled at first with a white grumous mass which is closely attached to the inclosing walls, and from which are slowly developed the organs of fructification. The mature perithecia at length become black within, and the upper portion breaks away, leaving the cup-shaped base attached to the matrix. Having now for several years studied these various forms I am satisfied that *Sphæria Quercuum*, Schw. includes all the following so-called species, viz., *Sphæria mutila*, Fr.;¹ *S. ambigua*, Schw.; *S. Meliæ*, Schw.; *S. entaxia*, C. & E. in Grevillea, vol. 6, p. 14; *S. eriostega*, Id.; *S. viscosa*, Id., vol. 5, p. 34; *S. erratica*, Id., vol. 6, p. 95; *S. thyoidea*, Id., vol. 6, p. 14; *S. pyriospora*, Ell. Bull. Torr. Bot. Club, v. p. 46; *Botryosphæria pustulata*, Sacc. Fungi Veneti, Ser. IV. p. 3; *Dothidea venenata*, C. & E. in Grev., vol. 5, p. 95; *D. Cerasi*, Id., vol. 5, p. 34; *Thümenia Wisteriæ*, Rehm in Mycotheca Universalis, No. 971; (*Melogramma Wisteriæ*, Cke., Grev. vol. 7, p. 51), and probably *Sphæria Hibisci*, Schw.; *S. Persimmons*, Schw.; and *S. Cratæg,i* Schw. *Valsa mahaleb*, C. & E. in Grev., vol. 6, p. 11, is also, according to my specimens, only the young and imperfectly developed state of the same thing. *Melogramma Aceris*, C. & E., Grev., vol. 7, p. 8, is also, without much doubt, to be included in the above list, though this species and *S. eriostega*, C. & E., are unknown to me except from the descriptions in Grevillea. Of all the others I

¹ At least as that species is represented in Rav. Fungi Caroliniani Exsiccati, Fasc. III. No. 62. See also remark in Grevillea, vol. 4, p. 97, under *Melogramma Quercuum*, Schw.

have examined authentic specimens, most of them in all stages of growth.

In all these different forms the character of the fructification is the same, or at most there is only a slight variation in the size of the asci and sporidia, so that from a microscopical examination of the fruit alone it would be impossible to say to which of the above species any particular specimen should be referred. This similarity will be readily seen on examining the figures in Grevillea illustrating the species cited. All have the same broad clavate, obtuse, stipitate asci which are often subject to a kind of deformity, being bent almost double. The paraphyses are simple or sparingly branched, of a gelatinous nature, and, like the asci, soon dissolved.

The sporidia are two-ranked, mostly broad navicular, without septa, hyaline or filled with granular matter mixed with oil globules and become at length brown. Some of the sporidia are of a regularly elliptical shape; these are generally shorter and broader while the navicular sporidia are often much longer and narrower. The average size of the sporidia is about $.03^{\text{mm}}$ long by $.013^{\text{mm}}$ broad. In all the different forms the ascigerous perithecia are accompanied by others producing stylospores of the *Diplodia* or *Sphæropsis* type. (*Sphæropsis fibriseda*, C. & E., Grev. 5, p. 89. *Diplodia thyoidea*, C. & E., Grev. 5, p. 32.) These stylospores never assume the navicular form, but are always regularly elliptical, smaller than the ascospores, sub-hyaline and granular at first, soon becoming brown. Other perithecia are filled with minute hyaline oblong or subglobose microstylospores (spermatia) of which *Phoma fibriseda*, C. & E., Grev. 6, p. 2, is an example. The stylosporous perithecia may generally be distinguished from the others by their short cylindric ostiola, which in the ascigerous perithecia are oftener nearly obsolete.

By referring to the description of *Sphæria eriostega* in Grev. 6, p. 14, it will be seen that mention is there made of certain brown biseptate free spores, supposed to be ascospores. These brown biseptate spores are found in all the aforesaid forms; sparingly indeed for the most part, but always present and easily recognized among the generally hyaline sporidia. I have never seen these peculiar spores contained in asci, though I have examined during the past four years probably some hundreds of specimens. I consider them however to be true sporidia, and have

supposed that the formation of septa is only the first step in the process of germination; though unfortunately I can only conjecture this, as the sporidia which I have tried to cultivate on slides of moistened glass have thus far refused to germinate.

From an examination of the above notes it will be seen that, disregarding the somewhat variable ostiola, the various forms above noted differ from each other only in the fact that in some the perithecia are confluent and united in a partial stroma, while in others they are scattered and without any distinct stroma. The only question then is whether this variation alone is sufficient to constitute a specific difference? Were this variability in the vegetative character accompanied by a corresponding variation in the fruit, there could be but one answer; but as has been already stated, and as may be seen by referring to the figures published in Grevillea, and as I hope to show by the publication of actual specimens in the North American Fungi, the fructification in all these different forms is essentially the same. With just as much reason might a specific distinction be made between the cluster of culms sprung from a single grain of wheat planted in a good soil and the single culm from another grain growing in a poorer soil. This same variation in an allied species, *Sphæria gyrosa*, Schw., was not considered by Fries as by any means sufficient to warrant a specific distinction. In his *Elenchus Fungorum*, vol. ii. p. 84, under *S. gyrosa*, he says: "Erumpunt hæc tuberculosa composita e rimis corticis Quercus; sed in ligno decorticato, eadem adest omnino simplex, conferta, subconfluens, punctiformis absque stromate distincto; singularis morphosis sed in hac tribu non rara." These remarks apply as accurately, at least to the form on *Rhus venenata*, i. e., to *Dothidea venenata*, C. & E., as if made with reference to that particular case. If then these different forms are to be united, it only remains to decide whether they are to be referred to the genus *Sphæria* or to *Melogramma* or *Dothidea*; or whether it would be better to follow the example of some of the transatlantic mycologists and create a new genus for this particular case. But as the number of new genera, many of them with characters sufficiently obscure, is every day increasing, it would seem better to avoid this latter alternative. Throwing aside next, in this case, the generic name of *Sphæria*, from which genus the fungus under consideration may perhaps with propriety be excluded on account of the peculiar character of its perithecia,

there remains either *Dothidea* or *Melogramma* to be adopted. As remarked in Grevillea, vol. 5, p. 34, under *Dothidea Cerasi*, C. & E., that species is scarcely a good *Dothidea* for "the cells often approximate to perithecia; this remark applies equally well to *Dothidea venenata*, C. & E., and to all the other species enumerated.

There remains the genus *Melogramma*, with the characters of which our fungus, at least in its confluent forms, agrees sufficiently well; nor are the varieties in which the perithecia are scattered and single properly to be excluded. The fact that with age the upper portion of the perithecium falls away, leaving the base attached, shows that in every case there is at least the rudiments of a stroma to which the basal portion of the perithecium is permanently attached. A careful microscopic examination reveals the presence of this rudimentary stroma, formed from the condensed fibres of the mycelium at those points where the perithecia originate. Nor yet is the form of the sporidia inconsistent with the characters given by Tulasne to the sporidia of his genus *Melogramma*, viz.: "*Sporæ sæpius distichæ, lineari-lanceolatæ vel ovatæ et utrinque obtusissimæ, curvæ rectæve, pluriloculares aut continuæ, fucatæ, vel pallidæ.*" The sporidia in our fungus are not ovate it is true, but the elliptical form approaches so near to that shape that it hardly seems best to exclude the species on that account.

According to Tulasne, l. c., and Fries, Elench. ii. p. 85, *Sphæria Quercuum*, Schw. is the same as *Sphæria fuliginosa*, Pers., at least as that species is represented in the Exsiccata of Mougeot and Nestler, though Fries (l. c.) does not consider it the same as the *Sphæria fuliginosa* of Persoon's Synopsis. Without undertaking to determine whether the *Sphæria Quercuum*, Schw., is really identical with the original *Sphæria fuliginosa*, Pers., we are warranted in assuming on the aforesaid authority that it is at least the same as the *Sphæria fuliginosa* of the Exsiccata of Mougeot and Nestler, so that it will be proper to adopt "*fuliginosa*" as the specific name for our variable species, especially as the specific name *Quercuum*, given by Schweinitz, is only applicable to a single form. The name *fuliginosa* also is peculiarly appropriate on account of the sooty color of the old mycelium. If, then, the foregoing conclusions are correct, all the above-mentioned species should be reduced to one which it is proposed to designate as *Melogramma fuliginosa*.